SPIDR Update

Presentation to SEUS

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SPIDR

- SPIDR is a Small Explorer (SMEX) – Spectroscopy and Photometry of the IGM Diffuse Radiation
  - PI: Supriya Chakrabarti, Boston University
  - Uses measurements of warm/hot gas to map filamentary structure of the IGM (the cosmic web)
  - Foreground observations of hot gas in Local Bubble, Galactic supernova remnants, Galactic halo, nearby galaxies
  - Three wide-field imaging spectrographs including OVI and CIV lines
  - UV hyperspectral imaging achieved using a tomographic technique
- Proposal history
  - Submitted February 2000
  - Stage 1 selection August 2000
  - Concept study submitted December 2001
  - Stage 2 downselection June 2002

SPIDR Process

- Proposal submitted Feb 00, Stage 1 selection Aug 00, Concept study submitted Dec 01, Stage 2 downselection Jun 02.
- Concern over SPIDR method raised during downselect evaluation but not adequately retired.
- Independent assessment of SPIDR technique Oct 02 – Feb 03. Report confirms validity of technique but identifies error in SPIDR calculation of sensitivity. Study included face-to-face meeting at BU. SPIDR team accepts study findings on sensitivity calculation.
- Hertz chaired HQ review of SPIDR on Apr 22. Reviewed (i) expected sensitivity and (ii) whether science investigation is the same. Did not review whether science objectives can still be met. Review panel recommended termination to Kinney and Fisher.
- Kinney and Fisher recommended termination to Weiler.
- Weiler made decision to terminate.
- Termination letter sent to BU and GSFC on May 20.

STAT Report Conclusions

- The scientific goals of the SPIDR project, as described in the SPIDR Concept Study Report, are laudable and important.
- The proposed instrument has some clever design features which allow far ultraviolet spectroscopy over a rather wide field of view with a minimum of optical surfaces.
- There is general agreement on the prescription for calculating the variance in the brightness of a feature in a SPIDR image, and in the sensitivity of the instrument as currently designed.
- The results of blind simulations appear to be consistent with the STAT's expectations.
- A serious error has been made in the calculation of signal-to-noise in the presence of a diffuse background (sky background or scattered Lyman alpha background). The minimum detectable "cusp" in the cosmic web, or point source, lies in the neighborhood of 50,000 Photon Units rather than the 2000 Photon Units described in the Concept Study Report as 3-sigma sensitivity for a baseline one-week exposure with 3 spectrographs and 9 slits each.

SPIDR Numbers

- All numbers are quoted minimum detectable flux (MDF) for the wide field OVI spectrograph (called HISO in the proposal).
- Proposed MDF: 2,000 PU (2’ x 2’ x 1.0Å)
- Predicted MDF for current design: 32,000 PU (diffuse source, 2’ x 2’ x 0.83 Å), 8000 PU (point source, 5’ x 5’ x 0.83Å)
- Changes due to
  - Proposal error: factor of ~25 worse in MDF
  - Active shielding for detector, reduces detector background (x 8 lower rate)
  - Less conservative assumptions about sky background (x 2-3 lower rate)
  - Less conservative assumptions for detector QE (x 1.5 better QE)
  - Improved optical design
  - Longer exposures due to improved mission design (x 1.15 longer exposure)

SPIDR Findings

1. The February 2000 SPIDR proposal was flawed since, as proposed, the instrument could not attain the stated minimum detectable flux and, therefore, could not meet its specified science requirements . The recently proposed changes in the SPIDR design do not sufficiently mitigate the effect of the flaw in the SPIDR proposal.
2. In February 2000, NASA received several selectable Explorer proposals that addressed science objectives generally similar to those of SPIDR. SPIDR's stated minimum detectable flux and its ability to meet its declared science requirements were critical factors in the selection of SPIDR over these other proposed investigations.
3. The science investigation that SPIDR could undertake now with its lower sensitivity is not the same investigation that was proposed, evaluated, and selected by NASA.
4. The basis for SPIDR's selection over other proposed investigations has been compromised. Therefore, the appropriate way to determine the best opportunity for addressing the science objectives generally related to those of SPIDR is through a recompetition by all interested parties.